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FY21 Epi-Tech Surveillance Training

Thursday, October 1, 2020 - Thursday, September 30, 2021
DCS, Aberdeen Proving Ground, MD

Provided By
U.S. Army Medical Command

<u>Activity ID</u>	<u>Course Director</u>	<u>CME Planner</u>
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Accreditation Statement

The U.S. Army Medical Command is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Credit Designation

The U.S. Army Medical Command designates this Live Activity for a maximum of 5 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

This is a required handout. It must be disseminated to each learner prior to the start of the activity.

Statement of Need/Gap Analysis

The purpose of this CME activity is to address the identified gap(s):

1. Disease identification - Verification of disease by established case definitions have been utilized by the local health departments, Centers for Disease Control and Prevention, World Health Organization, and the Department of Defense. With the every changing list of reportable medical events and new emerging infections, case definitions change rapidly. Army epidemiologist conduct verification studies that monitor the efficiency of reporting by local public health experts and have concluded that completeness percentages for reportable medical events range as low as 35% for select diseases.
2. Outbreak reporting - Recent evidence have demonstrated that outbreak reporting and communication between public health agencies is poor. In fact, the Army failed to report six outbreaks in the DRSi between June 2016 and September 2016.
3. Surveillance techniques - Surveillance of common communicable diseases continues to be a problem among local MTFs. In fact, cases of campylobacter were not investigated in 2015 for PACOM MTFs, while 2016 cases of salmonella were not investigated. Civilian public health agencies are required to conduct investigations into all reportable medical events. However, DoD facilities often do not take initiative to conduct this investigation.

Learning Objectives

1. Based on case presentation, enhance your ability to improve case finding and surveillance practices within your local MTF.

Target Audience / Scope of Practice

Target Audience: The intended audience for this educational activity includes preventive medicine physicians, community health nurses, public health nurses, and epidemiology technicians.

Scope of Practice: This activity will improve the performance of preventive medicine personnel who conduct surveillance activities in inpatient and outpatient settings.

Disclosure of Faculty/Committee Member Relationships

It is the policy of the U.S. Army Medical Command that all CME planning committee/faculty/authors disclose relationships with commercial entities upon invitation of participation. Disclosure documents are reviewed for potential conflicts of interest and, if identified, they are resolved prior to confirmation of participation.

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Acknowledgement of Commercial Support

There is no commercial support associated with this educational activity.

Surveillance of Substance Abuse and Dependence



U.S. ARMY PUBLIC HEALTH CENTER

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31 August 2021

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The mention of any non-federal entity and/or its products is not to be construed or interpreted, in any manner, as federal endorsement of that non-federal entity or its products.

- Describe the characteristics of U.S. Army Soldiers who had a substance-related medical encounter or were prescribed opioids from 2016–2019.
- Understand the associations between alcohol use disorder (AUD) and other behavioral health factors in U.S. Army Soldiers and how it affects readiness.
- Explain the impact of the 2019 coronavirus (COVID-19) pandemic on substance use disorders in U.S. Army Soldiers from January 2019–December 2020.

- From 2001 to 2011, an estimated 10-15% of the U.S. population was diagnosed with substance use disorder (SUD), with the highest proportion occurring among adults between ages 18-44.^{1,2}
- Workers in occupations characterized by high physical job demands and hazardous working conditions are at increased risk for being diagnosed with a SUD.³
- Due to the composition of the Army⁴ and high levels of occupational stress, Soldiers are considered to be high risk for SUDs.
- Consequently, routine surveillance for SUD within the military is needed.

- To estimate the prevalence and incidence of substance abuse and dependence among U.S. Army Soldiers during 2016–2019.
- The objectives were to quantify and characterize Soldiers:
 - 1) Who had a medical encounter for substance abuse or dependence.
 - 2) Who were prescribed opioids.
 - 3) Who reported symptoms of alcohol use disorder (AUD).

Study Design and Population

- Retrospective Surveillance Analysis
- Active Component (AC) Soldiers:
 - Who made contact with the Military Health System (MHS) by receiving care or medication prescriptions at a Military Treatment Facility (MTF) or civilian health institution through TRICARE from 2016–2019.
 - Who completed a Periodic Health Assessment (PHA) in 2016.

Data Sources and Metrics

- Military Health System Data Repository (MDR)⁵
 - Medical encounters with substance-related codes from the International Classification of Diseases, 9th (ICD-9 codes) and 10th (ICD-10 codes) editions in the first diagnosis position seen by a behavioral health provider were extracted and categorized by substance type:
 - Alcohol, opioid, cannabis, hallucinogen, cocaine, inhalant, psychoactive, sedative, and stimulant.
 - Incident cases were Soldiers whose first medical encounter for substance abuse and dependence occurred after 2015 when compared to records from 2000
- Pharmacy Data Transaction Service (PDTs) was the source for opioid prescriptions.
 - The National Drug Code (NDC) classification from the Centers for Disease Control and Prevention (CDC)⁶ were used to identify opioid prescriptions.
 - High-dose opioid: The morphine milligram equivalent (MME) conversion factor at ≥ 90 MME/day—provided by the CDC.
 - $MME * \text{Strength per unit} * (\text{number of units/days of supply})$

- Periodic Health Assessment (PHA)⁷
 - The Alcohol Use Disorder Identification Test-Concise (AUDIT-C)⁸ is a self-report screening tool that evaluates hazardous drinking behaviors or potential AUD.
 - 5-point scale with scores ranging from 0 to 12.
 - Men with scores over 4 and women with scores over 3 were considered positive for hazardous drinking behavior or AUD.
 - PTSD Checklist-Civilian (PCL-C)⁹ measures how bothersome symptoms of PTSD have been over the last month.
 - A response of ‘yes’ on two or more questions on the Primary Care-Posttraumatic Stress Disorder (PC-PTSD) prompts the completion of the PCL-C.
 - 5-point Likert scale (i.e., 1=not at all, 5=extremely) with scores ranging from 17 to 85.
 - Soldiers with a score over 39 were categorized as displaying moderate to severe PTSD symptoms.¹⁰

- PHA (cont.)
 - Depression Symptoms: Patient Health Questionnaire (PHQ)-8¹¹ assesses the frequency of *depression symptoms*.
 - A response of “more than half the days” or “nearly every day” on at least one question on PHQ-2 prompts the completion of the 8-item version: the PHQ-8.
 - Soldiers with a score over 14 (score range: 0–24)¹² were considered positive for moderate to severe depression symptoms.

 - Social Factors
 - *Violent Behavior*: “Over the past month have you had thoughts or concerns that you might hurt or lose control with someone?”
 - *Suicidal Risk*: “Over the past month, have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?”
 - *Major Life Stressors*: “Over the past month, what major life stressors have you experienced that are a cause of significant concern or make it difficult for you to do your work, take care of things at home, or get along with other people (for example, serious conflicts with others, relationship problems, or a legal, disciplinary, or financial problem)?”

- Defense Manpower Data Center (DMDC)¹³
 - Demographic and military characteristics
 - Sex: male, female
 - Age: 17–24, 25–34, 35–64
 - Rank: junior enlisted (E1–E4), noncommissioned officers (E5–E6), senior enlisted (E7–E9), officers (O1–O8), and warrant officers (W1–W5)
 - Educational level: high school graduate, some undergraduate, undergraduate degree, graduate degree or higher
 - Race-ethnicity: non-Hispanic Black, non-Hispanic White, Hispanic, non-Hispanic Asian/Pacific Islander, non-Hispanic American Indian/Alaska Native
 - Marital status: married, single, divorced, other

Analytical Approach

- Univariate Statistics (e.g., percent and frequency):
 - Distribution of demographic and military characteristics
- Annual Crude and Stratified Rates:
 - Calculated by dividing the number of substance-related medical encounters or high-dose opioid prescriptions by total population and reported per 100,000 Soldiers
 - Rates stratified by sex, rank, age, and race-ethnicity
- Linear regression:
 - Tests for statistical significant trends in overall and strata-specific rates over the specified time period
- Multivariable logistic regression:
 - To determine which characteristics were significantly associated with screening positive for AUD on the AUDIT-C
 - Crude and adjusted odds ratios and 95% confidence intervals

Demographic and Military Characteristics Substance Abuse or Dependence, 2016–2019



Demographic and military characteristics^a of U.S. Army AC Soldiers with encounters for substance abuse or dependence^b during 2016–2019 (n=38,162)^c

Demographic Characteristics	2016–2019 n (%)
Sex	
Male	34,477 (90)
Female	3,685 (10)
Age (yr)	
17–24	21,413 (56)
25–34	12,315 (32)
35–64	4,434 (12)
Race-Ethnicity	
Non-Hispanic White	19,829 (52)
Non-Hispanic Black	10,421 (27)
Hispanic	5,665 (15)
Non-Hispanic Asian/Pacific Islander	1,418 (4)
Non-Hispanic American Indian/Alaska Native	634 (2)
Marital Status	
Single	20,376 (53)
Married	15,996 (42)
Divorced	1,716 (5)
Other ^d	70 (0.2)

- From 2016 to 2019, a total of 672,236 medical encounters for substance abuse or dependence were documented among 38,162 Soldiers.
- The majority of this population consisted of Soldiers who were:
 - Male (90%)
 - < 25 years old (56%)
 - White (52%)
 - Single (53%)

Demographic and Military Characteristics Substance Abuse or Dependence, 2016–2019



Demographic and military characteristics^a of U.S. Army AC Soldiers with encounters for substance abuse or dependence^b during 2016–2019 (n=38,162)^c (cont.)

Demographic Characteristics	2016–2019 n(%)
Rank	
E1–E4	26,051 (68)
E5–E6	8,333 (22)
E7–E9	2,225 (6)
O1–O8	1,273 (3)
W1–W5	280 (1)
Education	
Graduate Degree or Higher	553 (2)
Undergraduate Degree	3,267 (9)
Some Undergraduate	2,600 (7)
High School Graduate	31,419 (82)
Case Type	
Incident ^e	32,289 (85)
Prevalent ^f	5,905 (15)

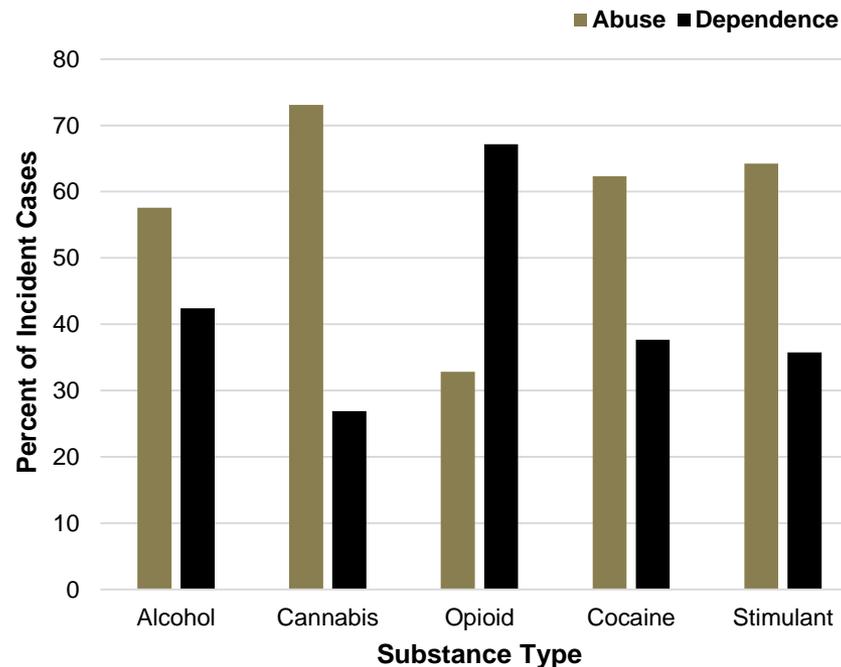
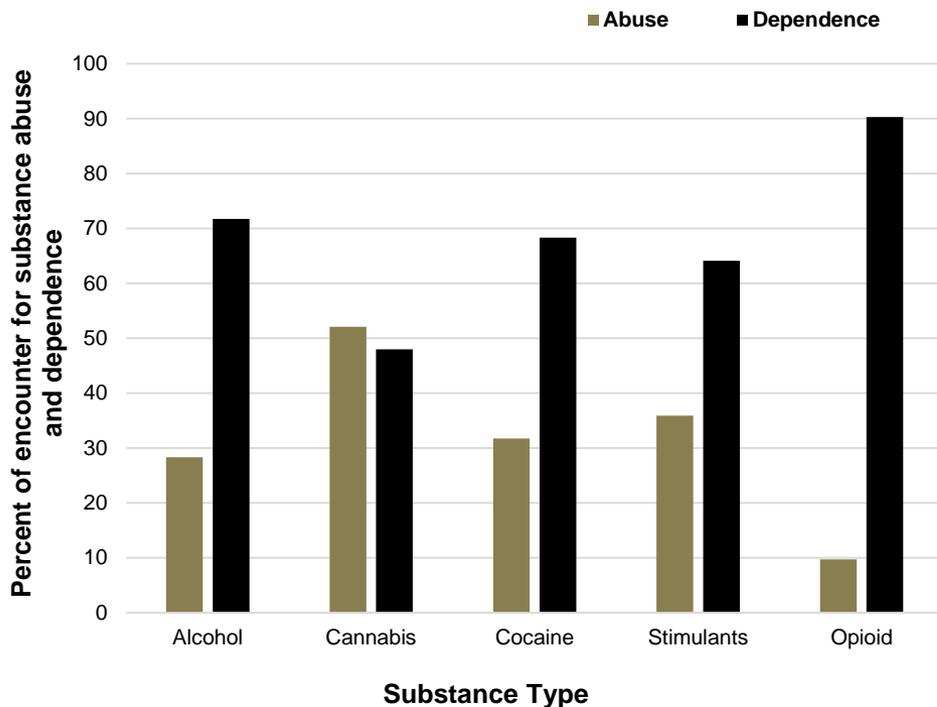
Legend: CY – Calendar Year, E – Enlisted, O – Officer, W – Warrant Officer
 Notes: ^aData obtained from Defense Manpower Data Center (DMDC). ^bData obtained from the Military Health System Data Repository (MDR). ^cIncluded Soldiers missing information for race-ethnicity (n=195), marital status (n=4), and educational level (n=323). ^dIncluded widowed and legally separated. ^eIncluded Soldiers whose first encounter for substance abuse and dependence occurred after 2015. ^fIncluded Soldiers whose first encounter for substance abuse and dependence occurred before 2016.

- Most Soldiers were:
 - Junior enlisted (68%)
 - High school graduates (82%)
- 85% of Soldiers with encounters for substance abuse and dependence were incident cases.

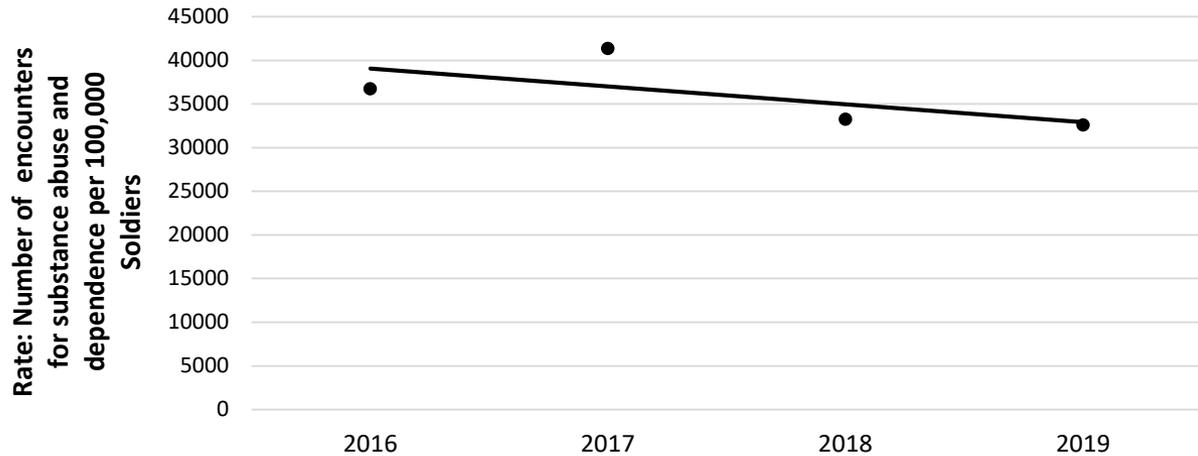
Distribution of medical encounters between abuse and dependence for the five most frequently treated substances among U.S. Army AC Soldiers, 2016–2019



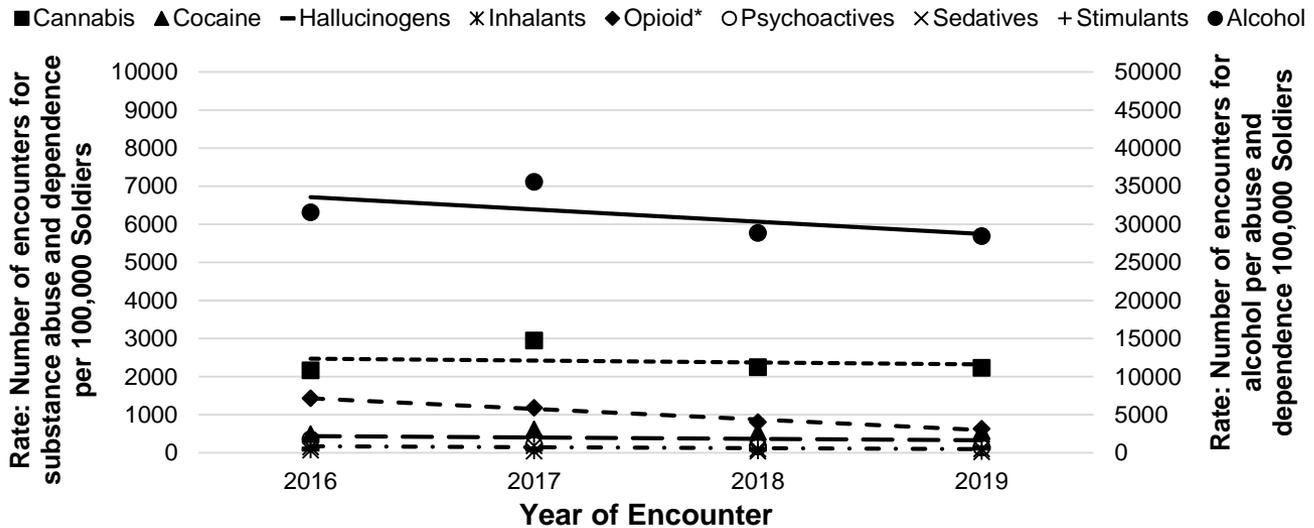
- 70% (n=473,128) of the total number of encounters were for dependence; the substances most frequently treated were alcohol (72%), cocaine (68%), stimulants (64%) and opioids (90%).
- Encounters for cannabis were evenly distributed between substance abuse (52%) and dependence (48%).
- Among incident cases, there were higher proportions of encounters for substance abuse among four of the five most frequently treated substances; only opioids had a significantly higher proportion of encounters for dependence (67%).



- The highest rate of medical encounters for substance abuse and dependence over the 4-year period occurred during 2017.

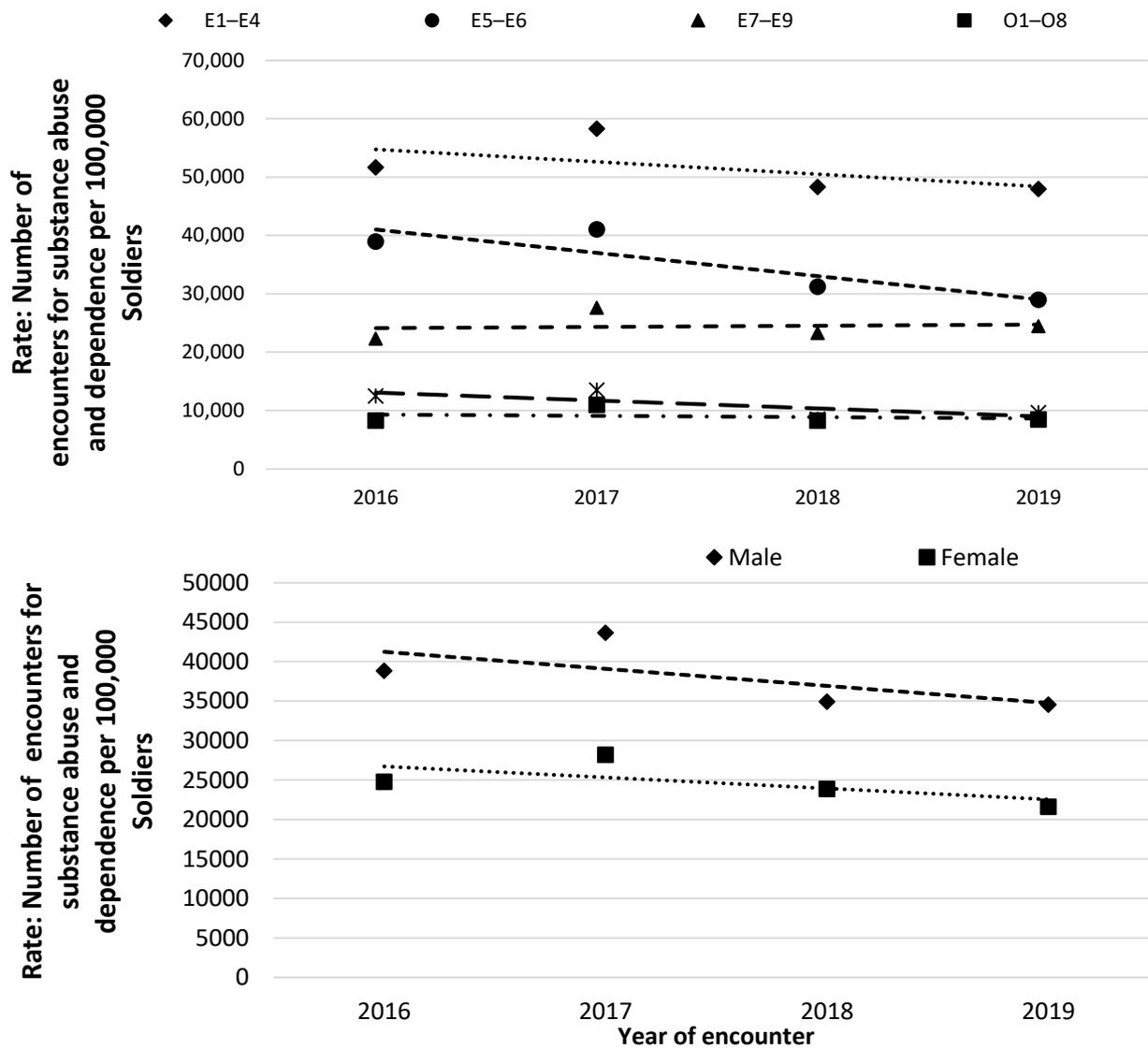


- The substances with the highest rates of medical encounters were alcohol and cannabis.



- There was a statistically significant decline in the rates of opioid medical encounters during 2016–2019 ($\beta = -276.92$, $p = 0.01$).

Stratified annual rates of medical encounters for substance abuse and dependence among U.S. Army AC Soldiers, 2016–2019



- Junior enlisted Soldiers had the highest rates of encounters.

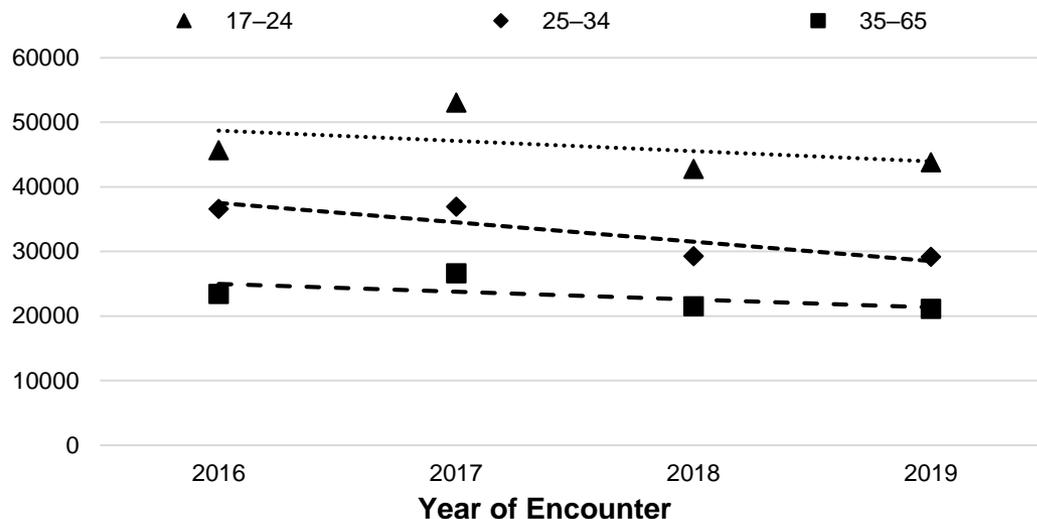
- Across all years, male Soldiers had higher rates of encounters compared to female Soldiers.

Stratified annual rates of medical encounters for substance abuse and dependence among U.S. Army AC Soldiers, 2016–2019

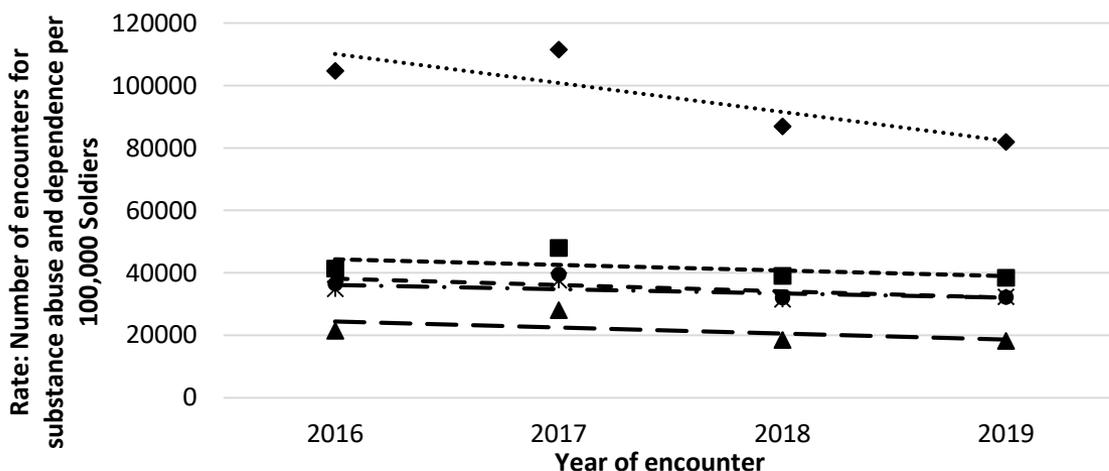


- Soldiers in the 17–24-year-old age range had the highest rates of medical encounters.

Rate: Number of encounters for substance abuse and dependence per 100,000 soldiers



● White ■ Black × Hispanic ▲ Asian/Pacific Islander ◆ American Indian/Alaska Native



- American Indian/Alaska Native Soldiers had the highest rates of medical encounters compared to Soldiers in other race-ethnicity categories.

Demographic and Military Characteristics

Soldiers Prescribed Opioid Medication



Demographic and military characteristics^a of U.S. Army AC Soldiers prescribed opioid medication during CY 2016–2019

	Soldiers Prescribed Opioids ^b 2016–2019	
	All (n=319,813)	High-Dose ^c (n=24,928)
Sex		
Male	265,117 (83)	21,028 (84)
Female	54,696 (17)	3,900 (16)
Age (yr)		
17–24	132,798 (42)	6,832 (27)
25–34	111,026 (35)	9,292 (37)
35–64	75,989 (24)	8,804 (35)
Race-Ethnicity^d		
Non-Hispanic White	170,587 (54)	14,492 (59)
Non-Hispanic Black	4,486 (24)	5,296 (22)
Hispanic	49,427 (16)	3,424 (14)
Non-Hispanic Asian/Pacific Islander	19,037 (6)	1,109 (5)
Non-Hispanic American Indian/Alaska Native	2,978 (1)	278 (1)

- There were 1,009,817 opioid prescriptions among 319,813 Soldiers.
- 8% (n=24,928) had at least one high-dose opioid prescription.
- Most were male (66%) or non-Hispanic White (68%).
- Soldiers with any opioid prescription were generally under age 25 (42%).
- Soldiers with a high-dose opioid prescription were older or over age 24 (72%).

Demographic and Military Characteristics

Soldiers Prescribed Opioid Medication



- The majority of the population were married (54% and 66%, respectively) and high school graduates (64% and 56%, respectively).
- There were significant differences by rank.
- Soldiers with any opioid prescription were mostly junior enlisted (51%), whereas Soldiers with a high-dose opioid prescription were split between junior enlisted (36%) and non-commissioned officers (28%).

Demographic and military characteristics^a of U.S. Army AC Soldiers prescribed opioid medication during CY 2016–2019 (cont.)

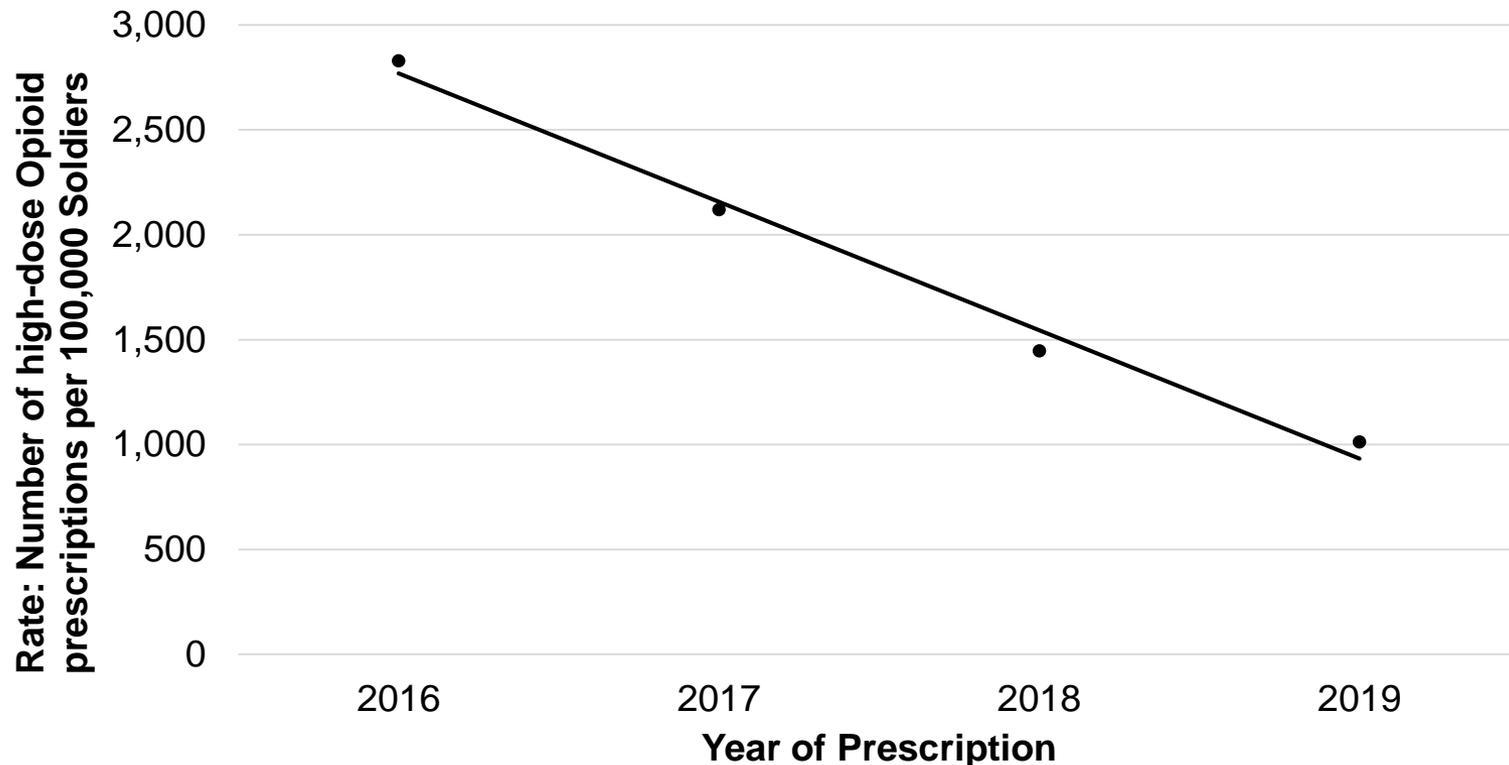
	Soldiers Prescribed Opioids ^b	
	All (n=319,813)	High-Dose ^c (n=24,928)
Marital Status^e		
Single	131,246 (41)	6,845 (27)
Married	171,694 (54)	16,325 (66)
Divorced	16,380 (5)	1,699 (7)
Other ^f	467 (0.2)	56 (0.2)
Rank		
E1–E4	163,070 (51)	9,077 (36)
E5–E6	74,011 (23)	7,017 (28)
E7–E9	34,324 (11)	4,290 (17)
O1–O8	40,349 (13)	3,651 (15)
W1–W5	8,059 (3)	893 (4)
Education^g		
Graduate Degree or Higher	22,529 (7)	2,240 (9)
Undergraduate Degree	60,687 (19)	5,501 (22)
Some Undergraduate	29,923 (9)	2,989 (12)
High School Graduate	204,513 (64)	13,953 (56)

Legend: CY – Calendar Year, E – Enlisted, O – Officer, W – Warrant Officer
 Notes: ^aData obtained from Defense Manpower Data Center (DMDC). ^bData obtained from Pharmacy Data Transaction System. ^cDosage ≥90 morphine milligram equivalent (MME). ^dRace-ethnicity information was missing for 329 Soldiers. ^eMarital status was missing for three Soldiers. ^fIncluded widowed and legally separated. ^gEducational level was missing for 208 Soldiers.

Unadjusted rates of high-dose opioid prescriptions

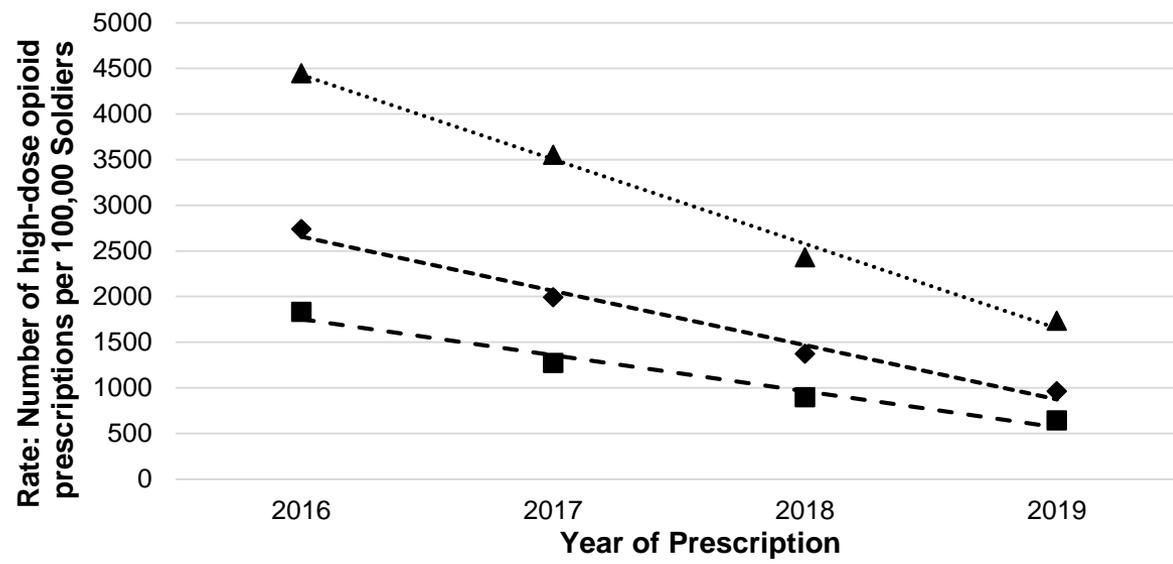
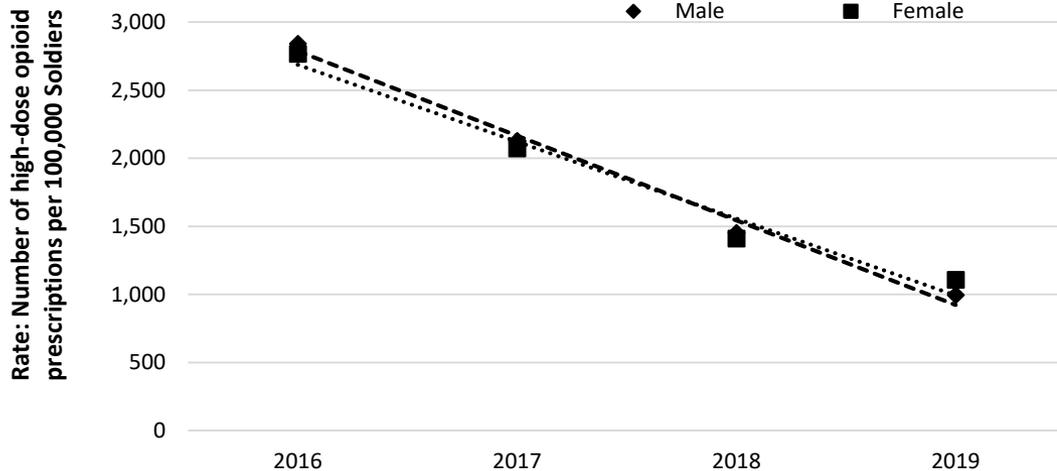


- The rate of high-dose opioid prescriptions declined significantly ($\beta=-775$, $p < 0.01$) across the four-year period, (n=34,602).



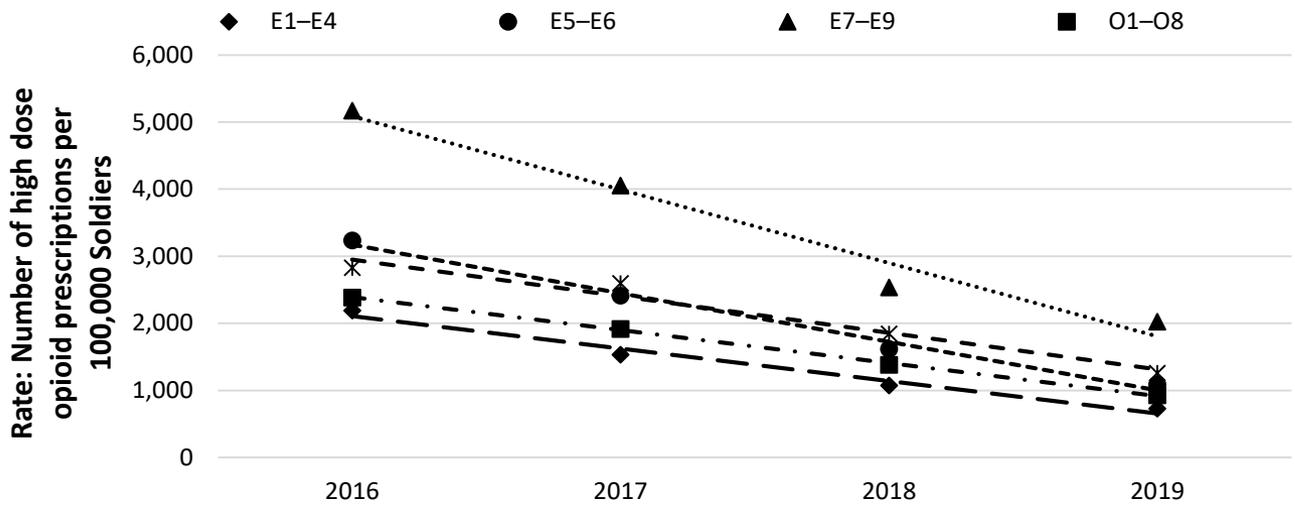
Unadjusted annual rates of high-dose opioid prescriptions among U.S. Army AC Soldiers, 2016–2019

Stratified annual rates of high-dose opioid prescriptions among U.S. Army AC Soldiers, 2016–2019

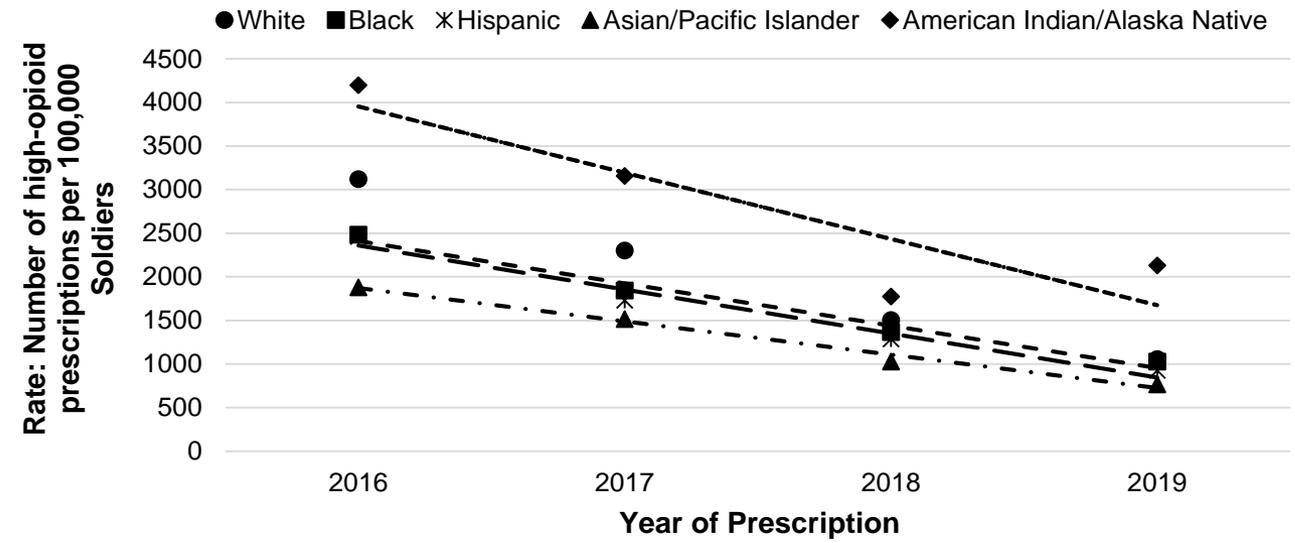


- The annual rates of high-dose prescriptions were equally high among male and female Soldiers.
- Soldiers in the 35–65-year-old age range had the highest rates of high-dose opioid prescriptions.

Stratified annual rates of high-dose opioid prescriptions among U.S. Army AC Soldiers, 2016–2019



- The highest rates of high-dose opioid prescriptions were among:
 - Senior enlisted
 - Non-Hispanic American Indian/Alaska Native Soldiers



- The lowest rates of high-dose opioid prescriptions were among:
 - Junior enlisted
 - Hispanic Soldiers



Multivariable Modeling Results

Association between Behavioral/Social Health Indicators & AUD, 2016



- Of the Soldiers who completed a PHA and the AUDIT-C in 2016, 7% (n=40,502) screened positive for hazardous drinking behavior and potential AUD.
- Significantly higher odds of screening positive for AUD were observed among Soldiers who:
 - Had thoughts of violence
 - Had thoughts of suicide
 - Screened positive for displaying symptoms of depression

Associations observed between social indicators and screening positive for Alcohol Use Disorder among U.S. Army AC Soldiers who completed the PHA, 2016

	Alcohol Use Disorder		
	total = 43,217 n (%)	cOR (95% CI)	aOR (95% CI) ^a
Major Life Stressors			
Yes	7,318 (13)	2.29 (2.23–2.35)	–
No	35,771 (6)	Ref	–
Thoughts of Violence			
Yes	659 (25)	4.62 (4.23–5.05)	2.83 (2.56–3.13)
No	42,428 (7)	Ref	Ref
Posttraumatic Stress Disorder			
Yes	4,725 (17)	3.03 (2.94–3.14)	–
No	38,067 (6)	Ref	–
Depression			
Yes	2,546 (18)	3.14 (3.00–3.28)	2.92 (2.78–3.06)
No	38,351 (6)	Ref	Ref
Thoughts of Suicide			
Yes	569 (21)	3.75 (3.42–4.12)	1.62 (1.45–1.80)
No	42,518 (7)	Ref	Ref

Legend: cOR – crude odds ratio, aOR – adjusted odds ratio, CI – confidence interval

Note: ^aAdjusted logistic model controlled for sex, age, race-ethnicity, thoughts of violence, symptoms of depression, and thoughts of suicide which was the most parsimonious model using Akaike Information Criterion.

- From 2016 through 2019, 38,162 U.S. Army Active Duty Soldiers were seen by a BH medical provider for substance abuse or dependence, with the highest rate occurring in 2017.
- Substance dependence (70%) made up the majority of all encounters for substance abuse and dependence over the four-year period.
- Encounters for abuse were the most frequent among incident cases, with the notable exception of opioids.
- Rates of medical encounters for opioid abuse or dependence decreased significantly during the study period.

- The rates of high-dose opioid prescriptions showed a statistically significant decreasing trend over the 4-year period.
- The most commonly documented substance for abuse or dependence was alcohol.
- Social indicators found to be significantly associated with higher odds of AUD in this study were screening positive for symptoms of depression and reporting thoughts of violence and suicide.

- Several groups were identified as at high risk for substance use disorders and high-dose opioid prescriptions.
- Male Soldiers had higher rates of medical encounters for substance abuse and dependence compared to female Soldiers but both had similarly high rates of high-dose opioid prescriptions.
- American Indian/Alaska Natives Soldiers had the highest rates of substance-related encounters and high-dose opioid prescriptions.
- Young (17–24 years old) and junior enlisted (E1–E4) Soldiers had the highest rates of encounters for substance abuse and dependence.
- In contrast, senior enlisted (E7–E9) and older Soldiers had the highest rates of high-dose opioid prescriptions.

- Medical encounters do not capture the true prevalence or incidence of substance abuse and dependence because these only represent Soldiers who made contact with the health care system.
- Estimates of AUD obtained using the AUDIT-C on the PHA may be an underestimate. Soldiers may be reluctant to answer the questions on the AUDIT-C honestly because the PHA is not anonymous.

- These findings suggest the need to continue substance abuse screening and treatment efforts, and the need for novel preventive solutions targeted toward high-risk populations, particularly for alcohol abuse and dependence.
 - For example, an educational program/intervention administered during initial military training targeting young and early-career Soldiers.
- Evaluate programs targeted at improving the continuum care for treatment of substance use disorders, such as the Army Substance Use Disorder Clinical Care (SUDCC), intensive outpatient care and residential rehabilitation facilities.
 - Current efforts are underway to assess the effectiveness of SUDCC within BSHOP.
- Future APHC studies may incorporate hospitalizations, examine comorbidity—to include injury—and assess potential impacts of the COVID-19 pandemic.

Substance Use Disorder Diagnoses, Hospitalizations, and ER Visits

- The COVID-19 pandemic and resulting economic recession have negatively affected the behavioral health of many people and created new challenges for people with, or at high risk for, a substance use disorder (SUD).¹⁴
- Pandemic-related stressors are further compounded by the unique circumstances of Army personnel, such as frequent relocation and separation from family members during deployment.
- Further investigation into the behavioral health consequences of the COVID-19 pandemic on Soldiers is warranted.

To compare trends in rates of SUD diagnoses, SUD-related hospitalizations and ED visits before (January 2019–February 2020) and during (March 2020–December 2020) the pandemic.

Study Design and Population

- Interrupted time series analysis using Autoregressive Integrated Moving Average (ARIMA)
- Active Component (AC) Soldiers
 - Who made contact with the Military Health System (MHS) by receiving care at a Military Treatment Facility (MTF) or civilian health institution through TRICARE from 2019–2020.

Data Sources and Metrics

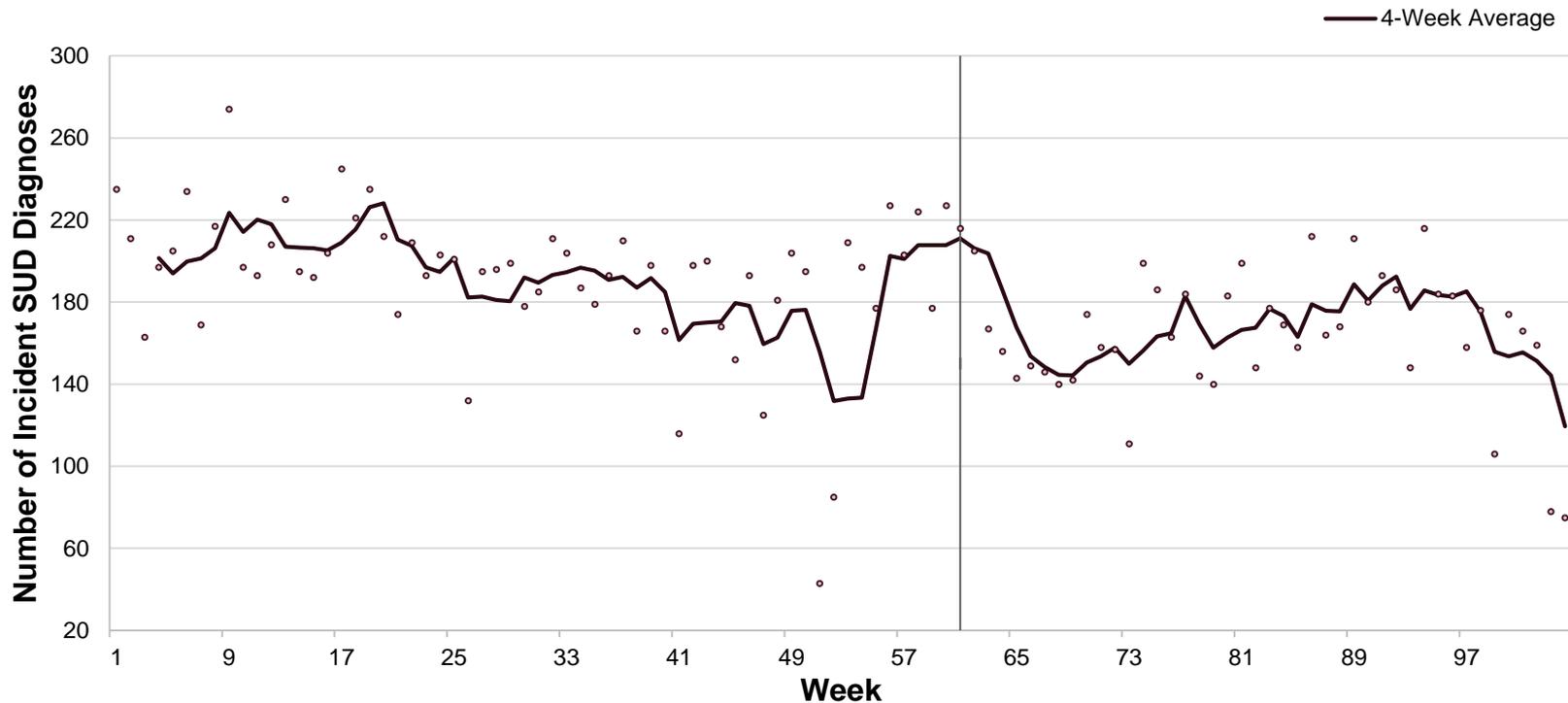
- MDR was the source for medical encounter data used to define substance-related outcomes.
 - *Incident SUD Diagnosis*
 - First in-patient admission with a SUD ICD-10 code in any diagnostic position.
 - Second outpatient encounter with a SUD ICD-10 code in the primary diagnostic position.
 - *Hospitalization for SUD*
 - Inpatient admission with a SUD code in the primary diagnostic position.
 - *SUD-Related Emergency Room Visit*
 - Emergency room encounter with a SUD code in any diagnostic position.

Analytical Approach

- ARIMA models estimate an immediate increase or decrease in the outcome (a “step change”), as well as a long-term change in slope (a “ramp”).
 - Models controlled for short-term changes due to federal holidays.

Incident SUD Diagnoses by Week 2019–2020

- There were an estimated 39.5 fewer SUD diagnoses per week than expected following the onset of the pandemic ($p < .001$, 95% CI -54.5 to -24.6).

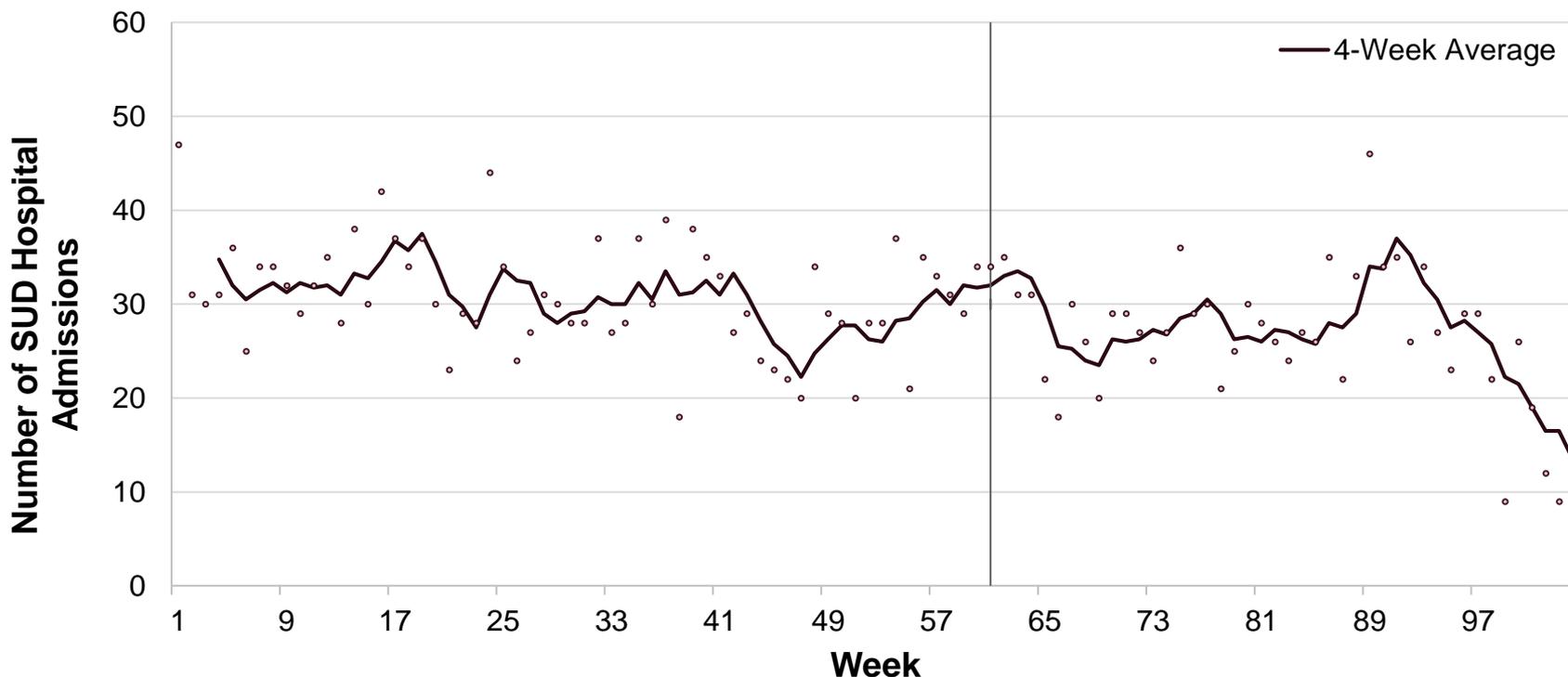


Incident SUD Diagnoses by Week among U.S. Army AC Soldiers, 2019–2020

Primary SUD Diagnosis Hospitalizations 2019–2020



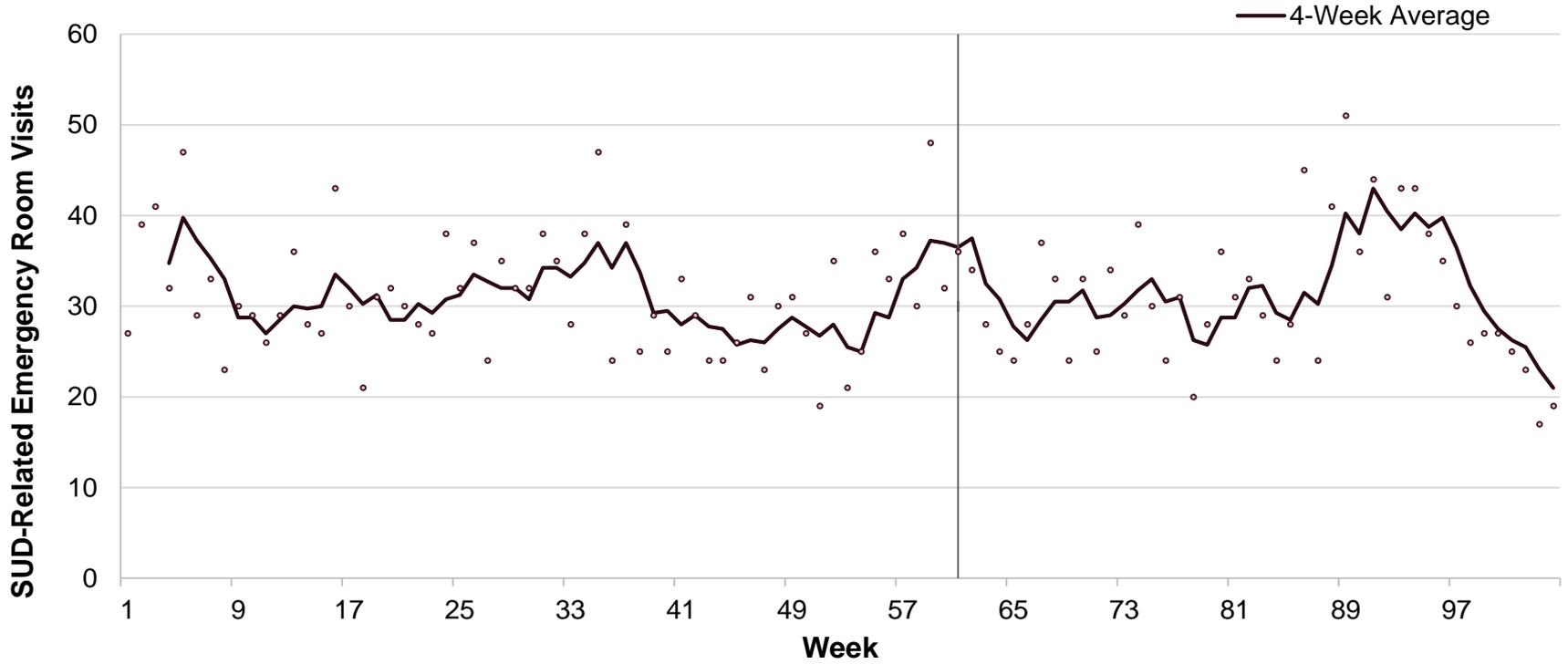
- There was not a statistically significant change in the number of hospital admissions for SUDs following the onset of the pandemic.



Hospital Admissions with a Primary SUD Diagnosis by Week among U.S. Army AC Soldiers, 2019–2020

Primary or Secondary SUD Diagnosis ER Visits 2019–2020

- There was not a statistically significant change in the number of SUD-related ER visits following the onset of the pandemic.



Emergency Room Visits with a Primary or Secondary SUD Diagnosis by Week among U.S. Army AC Soldiers, 2019–2020

- A significant decrease was observed in the weekly number of SUD diagnoses during compared to before the COVID-19 pandemic.
 - AUDIT-C from the PHA will be used to assess changes in hazardous drinking behavior before and during the COVID-19 pandemic.
- Significant differences were not observed in the weekly number of SUD-related hospitalizations and ER visits before and during the COVID-19 pandemic.
- Examine cases of substance use and comorbid behavioral health conditions and psychosocial circumstances.

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